UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/755,164	01/09/2004	Sheng-Ping Zhong	S63.2H-14226-US01	1268

490 7590 02/03/2010

VIDAS, ARRETT & STEINKRAUS, P.A.
SUITE 400, 6640 SHADY OAK ROAD
EDEN PRAIRIE, MN 55344

EXAMINER	
RIDER, LANCE W	

ART UNIT	PAPER NUMBER
1618	

MAIL DATE	DELIVERY MODE
02/03/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/755,164	ZHONG ET AL.	
	Examiner	Art Unit	
	LANCE RIDER	1618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 November 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-41* is/are pending in the application.

4a) Of the above claim(s) *31-33* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30 and 34-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :01/09/2004, 04/21/2004, 06/27/2005, 12/09/2005.

DETAILED ACTION

Status of Claims

Claims 1-41 are currently pending, claim 33 has been withdrawn due to the restirction requirement filed on June 25th 2009. Claims 1-32, and 34-41 were subject to an election of species on October 27th 2009.

Election/Restrictions

Claims 31-33 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Group, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on July 23rd 2009 and November 25th 2009.

Applicant's election of Group I in the reply filed on July 23rd 2009 and applicant's election of the species of catheter, alginic acid for both coating layers, calcium, a polyfunctional aziridine compound, and gadolinium in the reply filed on November 25th 2009 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Information Disclosure Statement

The Information Disclosure Statements (IDS)s, filed by applicant on January 9th 2004, April 21st 2004, June 27th 2005, and December 9th 2005 have been considered by the examiner in the present case.

Priority

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994).

The disclosure of the prior-filed application, Application No. 09/993907, fails to provide adequate support or enablement in the manner provided by the first paragraph of 35 U.S.C. 112 for one or more claims of this application. The prior filed application has no mention of any device containing a first and second layer, and no examples of any device matching the claims of the instant application is found in the specification or examples of the prior filed application. The claims, therefore, are not afforded benefit of the filing date of the '907 Application. The effective filing date of this Application is January 9th 2004. The Michal U.S. Patent 6,287,285 reference(s) is therefore competent prior art under 35 U.S.C. 102(b).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-30, and 34-41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 34 recite the term “differentiated from the environment”. What constitutes a difference, and how do the coatings differentiate themselves from the environment? This term renders the claim indefinite. Claims 2-33 and 35-31 are also considered indefinite as they are dependent upon claims 1 and 34 and do no rectify the indefinite nature of the independent claims.

Claim 19 recites the limitation "first region comprises" in regards to claim 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 37 recites the limitation "first region comprises" in regards to claim 1. There is insufficient antecedent basis for this limitation in the claim.

Claims 1 recites the term “”said first and second hydrogel polymers being the same or different”. This term is considered indefinite as the two polymers have different properties. No matter what the polymers are they must be different in some way in order to have different properties. As applicant stated in their reply, the polymers can both be in the same general class, both being comprised of alginate, but they must still be

different. The properties of a composition and its function are inseparable; therefore if they have different properties, they must have different compositions. Claims 2, 4, 6, 8, and 10-30 are also considered indefinite as they depend from independent claim 1 and do not rectify the indefinite nature of the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Although the search was not expanded beyond the current elected species, art reading on the generic claims was found incidentally to the search for the elected species. For purposes of compact prosecution that prior art is applied in the following 102 rejections.

Claims 1, 3, 5, 7, 9, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Buirge U.S. Patent 5,735,897 as evidenced by Beall U.S. Patent 4,729,892.

Buirge discloses medical devices comprising coatings of water swellable polymers (hydrogels). The coatings are comprised of a first layer (a substrate having a surface), a second outer layer, and a third highly swellable inner layer sandwiched in between, meeting the limitations recited in instant claim 1. (See figure 2 and column 2,

lines 49-67 and claims 8-13 of Buirge.) The polymers used in the coating are comprised of different polymers for the highly swellable polymer layer and the outer covering layer, meeting the limitation recited in instant claim 3. The polymer layers can be made of polysaccharides (heparin) and polypeptide chains (collagen), meeting the limitation found in instant claim 5 and 7. (See column 5, line 21 and column 3, line 29 respectively.) The inner and outer layers contain polymerization initiators, meeting the limitations of instant claim 9. (See claim 13 of Buirge.)

The polymers of the invention are crosslinked water swellable polymers (hydrogels). Beall provides evidence that crosslinked hydrogels are inherently capable of being visualized by MRI, Making them contrast agents themselves. (See the abstract and claims 1-9 of Beall.) Meeting the limitations for contrast agents found in instant claims 1 and 19.

Claims 34 and 37 are rejected under 35 U.S.C. 102(b) as being anticipated by Buirge U.S. Patent 5,735,897 as evidenced by Beall U.S. Patent 4,729,892.

Ronan teaches shaped medical devices comprising a coating covering athe surface of a substrate such as a catheter. The coating contains both ionic crosslinking agents (calcium) and non-ionic crosslinking agents in alginate hydrogels. As there is no distinction as to how much of each crosslinking agent is present either in the inner or outer region, a composition fully crosslinked with both calcium and glutaraldehyde meets the limitations of instant claims 34 and 37. The inner layer would then comprise both ionic and non-ionic crosslinking agents, and the outer region would comprise both

ionic and non-ionic crosslinking agents. (See claims 1 and 4-8 and column 7, lines 54-67.)

The polymers of the invention are crosslinked water swellable polymers (hydrogels). Beall provides evidence that crosslinked hydrogels are inherently capable of being visualized by MRI, Making them contrast agents themselves. (See the abstract and claims 1-9 of Beall.) Meeting the limitations for contrast agents found in instant claims 1 and 19.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-29 and 34-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Michal, et al., U.S. Patent 6,287,285 in view of Ronan, et al., U.S. Patent 6,060,534, Brazel, C.S., et al., (Poceedings of the Second Joint EMBS/BMES Conference, 2002) and Weissleder, et al., U.S. Patent 5,514,379.

Michal teaches medical devices having a coating bonded to the surface of the device with an outer hydrophilic or therapeutic coating. The a coating is comprised of a binding component (crosslinking agent) such as a polyaziridine mixed with a hydrophilic component containing carboxyl groups such as alginic acid, forming a hydrophilic (lubricious) layer on the device. The device is further taught to be a catheter. (See claims 1-14 and 21 of Michal.) The coating also comprises an inorganic ion such as a salt like sodium chloride, meeting the limitations of claim 41. (See claim 25 and column 11, lines 17-45.)

Michal does not teach that the device further contains an ionic crosslinking agent or a contrast agent (other than the hydrogel composition itself) contained in the coating. Michal also does not teach why the outer layer of the device would contain a higher crosslink density than the inner region.

Ronan teaches a method for coating medical device with alginate hydrogels containing ionic and non-ionic crosslinking agents. The method teaches selectively crosslinking the device made of hydrogels such as alginate to form sets of ionic or non-ionic crosslinks. See claims 1 and 4-8. The crosslinking ions used to ionically crosslink the hydrogels (particluarly alginate) are calcium ions. The introduction of both ionic and non-ionic crosslinks is taught to provide a device with higher crosslink density and improved stiffness, modulus, yield stress, and strength. (See column 3, lines 19-54, column 7, lines 54-67, and column 8, lines 1-9.) Ronan also teaches that the materials can be made to form devices having a shape set by non-ionic crosslinks and a second shape set by ionic crosslinks allowing for in vivo reshaping of the device as the ionic crosslinking agent is stripped from the device. The addition of the plasticizer glycerol is taught to facilitate polymer chain motion during and after reshaping the device, meeting the limitation recited in instant claim 40. Methods for applying stripping or crosslinking agents by dipping or spraying the device are also taught. (See column 5, lines 58-67, and column 6, lines 1-26.) Devices such as catheters made in this way allow for stiffness during implantation and subsequent softness for patient comfort after stripping. (See column 9, lines 5-7.) The devices are also stated to contain therapeutic agents such as medicines. (See column 6, lines 37-40.) The application of the ionic crosslinking agent to the device taught by Michal on the surface of the device through dipping or spraying the device would have been obvious to the skilled artisan at the time of the invention given the teachings of Ronan, and would have been an obvious choice given the ease of the procedure. The depth of the crosslinking would depend upon the

amount of time the ionic crosslinking agent was applied resulting in a higher amount of crosslinks in the outer layer of the device.

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to form a catheter coated by a layer of alginate and a non-ionic crosslinking as taught by Michal with the further addition of an ionic crosslinking agent and medicines as taught by Ronan. The skilled artisan would have been motivated to use the methods taught by Ronan for improving catheters coated with alginate by using both ionic and non-ionic crosslinking agents and medicines in order to form a medicated catheter with greater stiffness, modulus, yield stress, and strength, the ability to adjust its shape after implantation, and having the ability to deliver therapeutic drugs to a patient.

Michal and Ronan do not teach a specific reason for why the outer layer of the device would contain a higher crosslink density than the inner region, nor does the combination of Michal and Ronan teach the addition of a contrast agent to the device.

Brazel teaches the surface-preferential crosslinking of hydrogels in order to minimize the burst effect and to design tunable lag times for drug delivery from hydrogels. (See the title and abstract of Brazel.)

It would have been prima facie obvious to one of ordinary skill in the at the time of the invention to modify the medicated hydrogel coated device of Michal and Ronan with a higher crosslinking density at the surface of device (as taught by Brazel) in order to form an improved drug releasing catheter without any burst effects for the drugs contained within the hydrogel coated catheter. The skill artisan would have been

motivated to make this combination to allow for the even delivery of the drugs found in the coatings of Ronan and Michal. disclose a medicated hydrogel coated device and readily available methods for modifying only the surface of the device.

Michal, Ronan, and Brazel do not teach the addition of a contrast agent to the device.

Weissleder teaches hydrogel compositions containing therapeutic and diagnostic agents. The hydrogels are taught to be loaded with a reporter group such as Gd-DPTA. (See column 4, lines 1-8.) Particularly preferable hydrogels for this invention are made of polysaccharides like polymanuronic or polygalaturonic acid (the components of alginate). (See column 4, line 29-30 and claim 12 of Weissleder.) Hydrogel compositions are taught in which the GD-DPTA is crosslinked into the hydrogel backbone. (See cexamples 2 and 3 and claim 17). The hydrogels are stated to be useful for coating medical devices to allow for visualization of the devices in a patient. (See example 6, and column 5, lines 24-31.)

Ronan, Michal, and Bazel teach a hydrogel coated catheter made of alginate with a non-ionically polyaziridine crosslinked inner layer allowing bonding to the catheter surface and a strengthened ionically calcium crosslinked outer surface that allows for steady release of therapeutic drugs. Weissleder teaches the addition of Gd-DPTA into polysaccharide hydrogels in to allow for visualization of medical devices.

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to modify the device of Michal, Ronan, and Bazel to include a Gd-DPTA reporter group capable of being imaged by MRI. The skilled artisan would have

been motivated to make this combination in order to form an improved medical device capable of being imaged in a patient allowing for tracking the device during its implantation and removal.

Ronan, Michal, and Bazel and Weissleder teach a catheter coated by a medicated alginate hydrogel containing salts and plasticizers, with an outer layer comprising an ionic crosslinking agent, an inner layer comprising a non-ionic crosslinking agent, wherein the outer layer has a higher crosslinking density than the inner layer, and the catheter comprises a Gd-DPTA contrast agent in the coating. The higher crosslinking of the outer layer compared to the inner layer would cause the outer layer to swell less than the inner layer meeting the functional swelling limitations recited in instant claim 1. The polymers are different given the nature of the crosslinking agents within them, meeting the limitations of instant claim 3. The makeup of the coatings being alginate, polyaziridine, calcium, and Gd-DPTA, meet all of the limitations recited in instant claims 1-29, 34-41.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Michal, et al., U.S. Patent 6,287,285 in view of Ronan, et al., U.S. Patent 6,060,534, Brazel, C.S., et al., (Poceedings of the Second Joint EMBS/BMES Conference, 2002) and Weissleder, et al., U.S. Patent 5,514,379 as applied to claims 1-29, 34-41 above, and further in view of Wang U.S. Patent 6,135,992.

Ronan, Michal, Bazel and Weissleder teach a catheter with a medicated hydrogel coating made of alginate with a non-ionically polyaziridine crosslinked inner layer

allowing bonding to the catheter surface and a strengthened ionically calcium crosslinked outer surface that allows for steady release of therapeutic drugs that is visible by MRI, as taught for claims 1-29 and 34-41 above.

Ronan, Michal, Bazel and Weissleder do not teach a specific type of catheter such as a neurointerventional catheter, as claimed in instant claim 30.

Wang teaches microcatheters used for neurointerventional therapy. (See column 1, lines 9-22.) Wang further teaches that such catheters are used for delivering diagnostic and therapeutic agents to selected areas within the body, like the brain.

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to use the catheter coatings and methods to make such coatings taught by Ronan, Michal, Bazel and Weissleder on a neurointerventional catheter as taught by Wang in order to form a specific improved catheter with a coating capable of delivering therapeutic and diagnostic agents. The skilled artisan would have been motivated to make this combination in order to form a catheter that could deliver therapeutics and diagnostic agents to the brain. The combination is merely the improvement of a known device (a neurointerventional catheter) with known techniques for improving catheters.

Conclusion

No claims are currently allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LANCE RIDER whose telephone number is (571)270-1337. The examiner can normally be reached on M-F 11-12 and 1-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael G. Hartley can be reached on (571)272-0616. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/LANCE RIDER/
Examiner, Art Unit 1618

/Eric E Silverman/
Primary Examiner, Art Unit 1618